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rule should have been corrected before the book fell into the hands of students.

We have felt it to be our duty to call attention to what we believe to be an unscientific treatment of some of the most important subjects discussed in Mr. Farrar's volume, because other parts of the work are of such undoubted merit that it will be widely circulated in England and in this country. If we could presume to make a suggestion to Mr. Farrar, we should advise him to publish the first 127 pages of his Syntax as a work by itself, or, at least, to submit the questions that arise in Greek syntax to the same scientific investigation which he is accustomed to use in Comparative Philology, and which shows itself so conspicuously in the earlier parts of the work before us.

7.—*Rapport sur le Progrès et la Marche de la Physiologie générale en France.* Par M. CLAUDE BERNARD. Paris: Hachette. 1867. pp. 237.

THIS handsome volume is one of the series of Reviews of the present *status* of the several natural sciences, which M. Duruy has invited the leading scientific men of France to prepare. Few kinds of books are apt to be so uniformly delightful reading as those essays which great students of nature have from time to time allowed themselves to make, upon the "philosophy" of their respective branches of research. M. Bernard's book belongs on the whole to this class, and partakes of its inherent charm, though in a less degree to our mind than the delightful *Introduction à la Médecine Experimentale,* which he published a couple of years ago,—probably because it is more "immersed in matter." The true refreshment, to a hard-working student, is to be able, not to retire wholly out of sight of the scene of his labors, but to banish for a time their importunate details. The simple cleansing of the person, as it were, from the laboratory dirt, and washing the dust out of weary eyes, is an agreeable release; and so is the relaxation of the mind from that high-strung attitude of vigilance, suspicion, and suspended judgment in which the more purely business hours of an investigator are necessarily passed. But when, in addition to this, he may still linger in the neighborhood of the darling branch of learning, define its problem and its method, continue by the imagination lines of research just opened, leap to their ideal end without anxiously toiling through all the steps that lie between, the exercise is not only a diversion from past labors, but becomes a salutary play, which reinvigorates and disposes for future exertions. A large portion of M. Bernard's book is taken up by a review of what has been accomplished for Physiology in France during the past twenty-five years. In this the author's own labors weigh certainly heavier than those of any other individual, and this gives to the narrative a certain tinge of egotism which has not always the charming *bonhomie* of that which pervaded the Introduction already spoken of. But there is plenty of "philosophy" notwithstanding, and although it may be thought that some of the distinctions the author makes are over-subtile, it is nevertheless certain that even the reveries of a man who, by a life of incessant practical scientific experience, has, compared with most of his contemporaries, acquired such a deep familiarity with nature as Bernard, merit a respectful attention.

The book itself is a little too technical for the general reader, but it is easy in a few words to indicate its main purport. In the first place, M. Bernard claims that general Physiology is a separate and autonomic science. A science has a right to be considered independent when its subject-matter, its problem, or its point of view is not embraced by any other science. Physiology has, to be sure, the same subject-matter as anatomy and zoölogy on the one hand, and organic chemistry on the other. But its problem as compared with that of the two former is practical instead of contemplative; that is, it aspires to control and change the phenomena; and, compared with organic chemistry, Physiology is characterized exclusively by a *point-de-vue nutritioniste.* Chemists may, for instance, some day produce in their laboratories every substance which exists in the animal body, and in so far their subject-matter will coincide with that of the physiologist. But, says M. Bernard, it is probable in each case that the *process* they follow will be quite distinct from that which will have obtained in the organism? The chemist separates fat into glycerine and acid by soda, the animal does it by *pancreatine.* The products may be identical, but the *instrument* in the case of the animal is of quite a special nature, namely, the *cell.* The mode of operation of the cell must be entirely peculiar; the laws of that mysterious influence which a particle of living matter exerts on dead matter with which it comes into contact (which are no other than the laws of *nutrition*, or the *organotrophic* laws, as Bernard calls them) are unlike any laws that prevail where what we call *life* is absent. Their study is the proper study of the physiologist, for they are the fountain-head from which all the more evident and tangible phenomena of the organism flow. It is only indirectly, and by their mediation, that we may ever hope to modify effectually these more palpable phenomena. Not until we understand the actions and reactions of different sorts of living and dead substance upon each other, and are able to foresee the properties of the resulting material, shall we be fully competent to descend into the arena and conquer and control. Short of that point, our interference can be but coarse and, so to speak, surgical.

We are thus thrown back upon the study of the simple properties of the cells or elementary organisms, — organic radicals (rather *radicles*), as Bernard calls them. What we name the functions of the body are merely exceedingly complex resultants of these properties and their varied play. All the faculties which the reader enjoys and takes cognizance of are but secondary, and due to the peculiar *arrangement* of his innumerable cells. He doubtless considers himself a land animal, or at the utmost semi-amphibious. But, in a strict physiological sense, he is an aquatic animal, that is, his *immediate* life, which is only the life of his cells, can only subsist in a watery medium, similar to that which surrounds them within the body. The only dry parts of him, surface of skin, hair, nails, are properly dead, and their office is mechanical, not vital. It is to their very deadness that he owes most of his independence of the oscillations in the condition of the surrounding world. All the other *radicles* of his being are beneath the surface, bathed in fluid. He is a microcosm, — an enormous republic, whose separate citizens all play appointed parts, and by an exquisite order, which, whatever we may think of its cause, cannot fail to fill us with wonder at the perfection of its beauty, furnish the means for their fellows to subsist, while each appears to be blindly fulfilling its mere individual destiny. The palpable movements which we call our life float up as the result. The muscle-cells lie darkly buried out of all contact with the external world; but when they put forth their property of contractibility, in blind obedience to the stimulus yielded by the activity of the nerve-tissue with which they are in contact, they bring food to our mouths and air to our lungs. The cells that live on the surface of our alimentary canal, on the other hand, serve as intercessors between the food and the muscles. They increase and multiply in the bosom of the medium afforded by the former, as M. Bernard thinks, and, when glutted, pour their secretions into the blood, helping to make it a fit habitat for the muscle. If we could devise a means of supplying a loose mass of muscle in a vase with the same medium that bathes it in the organism, we might in all probability, by stimulating it occasionally to contract, keep it indefinitely alive. Who can say what it might not grow into? And the same is true of any other mass of elementary cells. Their intrinsic life has no essential connection with that of the organism, and could continue anywhere where their appropriate medium was supplied. In the organism it happens to *be* supplied by the workings of the co-ordinate cells, that is all. It is no small service of M. Bernard's that he has put the expression *internal medium* into circulation. The *property* of an organic element, then, its own vital peculiarity, is quite distinct from the function it may perform in a given animal. The property is something intrinsic and fixed ; the functions depend wholly on the anatomical relations that exist in the animal. It is evident, for instance, that if we were possessed of no bone-cells, our *functions* of locomotion would have to be very different from what they are. We should perhaps succeed in rolling or crawling through the world in a not wholly discreditable manner. But there is no reason for supposing that the manners of our individual muscle fibres, considered *per se*, need undergo any corresponding change. M. Vulpian says, that, having cut a piece out of a nerve of an animal, and placed it under the skin, he found it many months afterwards in a normal condition. Here the elementary life continues while the usual function is wholly abolished.

The study of those facts of elementary life, which may be summed up under the name of nutrition and denutrition (for Bernard thinks that cell development and nutrition are indistinguishable), forms then the fundamental and more peculiar task of the physiologist. All special problems of function are consecutive, and presuppose these elementary relations as their ground of manifestation. They are in a measure anatomical and zoölogical problems, — of immense difficulty and practical importance no doubt, too, — but whose logical order is after the organotrophic problems.

These hints will give the reader a superficial idea of the programme which M. Bernard sets forth for his favorite science. And consistently with his belief in its ultimately practical character, he closes his Report with an earnest plea for the public endowment of laboratories with apparatus for the study of living animals. He relates the discouragements and difficulties which he had to suffer at the beginning of his experimental career, — difficulties under which other men less enthusiastic (Dumas, the chemist, for example) succumbed, and turned to other branches of research. He ascribes the ascendency of Germany in physiology at the present day to the existence there of those numerous and noble university laboratories, where students can learn so thoroughly the technical part of their pursuit. Certainly if physiology *is* to become some day the light in which medicine is to work, the demand is not immodest, and no other infant branch of learning is, even in a merely economical point of view, so well worth fostering ; while, on the other hand, no science needs to have more abundant means at its disposal to secure its steps. Experiments must be repeated and controlled with a patience which would drive a chemist, for example, to despair, in order to eliminate the variations caused by the immense number of unknown conditions that accompany each given case.

We must not, however, forget that the brilliant accomplishments M. Bernard hopes for are in the very dimmest future. In fact, it seems almost a sort of self-mockery to speak of them as our aim, while we stand as utterly ignorant as we do now. It is safe to say that the first step has not yet been made on the path which is to lead to the discovery of the laws of cell nutrition. The little we know of the effect of poisons on different tissues, the few experiments that have been made, chiefly in France, on the transplantation of tissues, and other scattered observations, are but random gropings after its entrance. So that an uncharitable person has fine scope for his sarcastic vein in presence of the pretensions of the bantling, which, before it is wholly cut loose from the dependence in which it has hitherto lived on zoölogy, anatomy, and medicine, begins to feel the breath of independent life in its nostrils, and, before it can even toddle, rejoices as a strong man about to run a race.

In fact, there is coming into existence, in the ranks of the medical profession, a decided impatience with the mass of so-called science, which is intruding and encroaching upon medical education in an ever-increasing degree. Dr. O. W. Holmes lately gave expression to it in an Introductory Lecture,* in which practical good sense vies with perfection of style and brilliancy of illustration. The amount of baggage which a doctor is now expected to carry in his head is growing too great for the unaided brain. The use of the ever-increasing number of *-scopes* and *-graphs* and *-meters* for diagnosis is alone more than any one man is adequate to; and when we think of the facts he must remember besides, to be considered "scientific," we grow fairly dizzy. It must be granted that by far the greater part of the matter recorded in physiological treatises has as yet found no application; for instance, the "laws" of nerve and muscle electricity, which Physiology wears among her brightest gems, have not, to our knowledge, furnished a single hint even towards electro-therapeutics. Dr. Holmes says: "We must not expect too much from 'science' as distinguished from common experience. There are ten thousand experimenters without special apparatus, for every one in the laboratory. Accident is the great chemist and toxicologist. Battle is the great vivisector. Hunger has instituted researches on food, such as no Liebig nor any Academic Commission has ever recorded. . . . . Medicine appropriates from every source. . . . . 'Science' is one of her benefactors, but only one out of many." But although this be quite true as matters at present stand, nothing could be more absurd than to set up any distinction of *principle* between science and common experience, or pretend that the objects of the former were by a fault of their nature too refined and impalpable to be turned to every-day account. What we call "science" differs from ordinary knowledge only in being more elementary and exact. Ordinary experience teaches us, for instance, that, if a man breathes the fumes of burning charcoal, his life is endangered. But the knowledge, though useful, is of the vaguest sort. It gives us only the final and apparent result of an immensely complicated series of processes. A chemist might in like manner say to an ignorant person left alone in his laboratory: "If you mix together all those substances you see in the bottles and jars, you will be in danger of making a very great frothing over, and perhaps a bad smell." The proposition would be a useful warning, but would possess no high degree of scientific dignity. But when the physiologist looks more closely into the fact of coal-gas poisoning, and discovers that it is due to the oxide of carbon in the gas, forming a combination with the red blood corpuscles, which is stable and prevents the corpuscles from absorbing oxygen in the lungs, he is not only put upon the track of a mode of recovering the patient (transfusion of blood), but a new stand-point is afforded him for the intelligence of many other phenomena.

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* Boston: David Clapp & Son. 1867.

We should not think slightingly of the enthusiasm of men like Bernard. Practical men found out long ago that it is, on the whole, a shrewd thing to encourage chemists and physicists in their at first sight most barren and merely curious speculations. And if at times they appear less tolerant of the manners of medical "scientists," and think the airs of superiority they assume are quite unwarranted by their performances, it can only be that the pretensions of the latter are premature and not that they are false. The absurdity they may contain is not that of the frog trying to look like an ox, but rather that of the embryo alligator furiously snapping its harmless jaws, while yet enclosed by the egg-shell. The science of organic life has no qualitative inferiority to that of inorganic life: it is only far behind it in development. It is still embryonic, — the matter with which it deals is so endlessly complicated, that the end of the thread which is to guide the physiologist through its labyrinthine turnings has not yet come into his hand.

We quite agree that it is a misfortune for a medical man to be born at this period of chaos and transition, to live in an age half-way between the comparative clearness of ignorance and the transparency of true wisdom, in waters, as it were, which are just beginning to precipitate their contents. The movements of Medical Science are but random gropings now. She turns her material and re-turns it, and overhauls it in every direction, that by new accidental combinations some better order may emerge. And she expects all her followers, more or less, to help in the process. This state of things will probably last a good while yet, and may have to get worse before it gets better. Practitioners and students will still be impelled to learn a mass of scattered and unapplied matter, merely from a vague hope that it *may* at some unforeseen moment prove of practical account. But there will be a continual process of "settling" all the while too. *Applied physiology* will tend to increase at a more and more rapid rate; and finally will form, like applied chemistry, a body of knowledge having a certain roundness of its own. Within its bounds the medical man may disport himself at greater ease than he does at present over the larger and more uncertain field of the undifferentiated lore; while the physiologist *pure* will be a wholly independent character, and reign undisturbed in his peculiar heights. Perhaps when the millennium arrives, the practical physician will be able to use his formulas without needing to know any more of the "science" of physiology than the navigator now knows of the way the tables he uses were constructed, or the manufacturing chemist of types, substitutions, or compound radicals. At present, if he have any ambition, he must start with an education which (whether literary or not) must be as thoroughly physical as that of the engineer and miner, and then economize his faculties of acquisition as well as he is able.

To conclude, it is interesting to find two men starting from such different points as Dr. Holmes and Professor Bernard come to so similar a conclusion, namely, that scientific medicine and practical medicine must be allowed, as rapidly as possible, to become materially independent of each other.

8.—*Life and Letters of Madame Swetchine.* By COUNT DE FALLOUX of the French Academy. Translated by H. W. PRESTON. Boston: Roberts Brothers. 1867. 1 vol. 12mo. pp. 369.

THIS book is a translation of the first volume of a work published some six years ago under the title of *Madame Swetchine: sa Vie et ses Œuvres.* The work attracted great attention, and was followed by the publication of Mme. Swetchine's letters and literary fragments to the number of six volumes. The account of the author's life, which introduced this immense mass of literary matter, is particularly well written, and has been judged worthy of being laid